Name key + 55 1/2 Date

AP: CHAPTER 5B

MACROMOLECULES (Proteins & Nucleic Acids)

+3 1. List 3 functions of proteins.

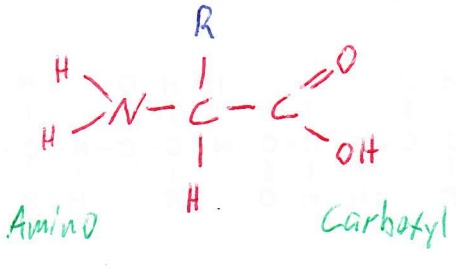
Enzymes, Provide Structure, Storage, Transport, Cellular Communication, Movement, defense

+3 2. What are 3 properties used to classify amino acids?

nonpolar, Polar, Electrically charged

+3 3. Every amino acid contains an Amino group, a Carboxyl group, and a Hydrogen atom bonded to a central carbon atom. Sketch the general structural formula for an amino acid.

+1



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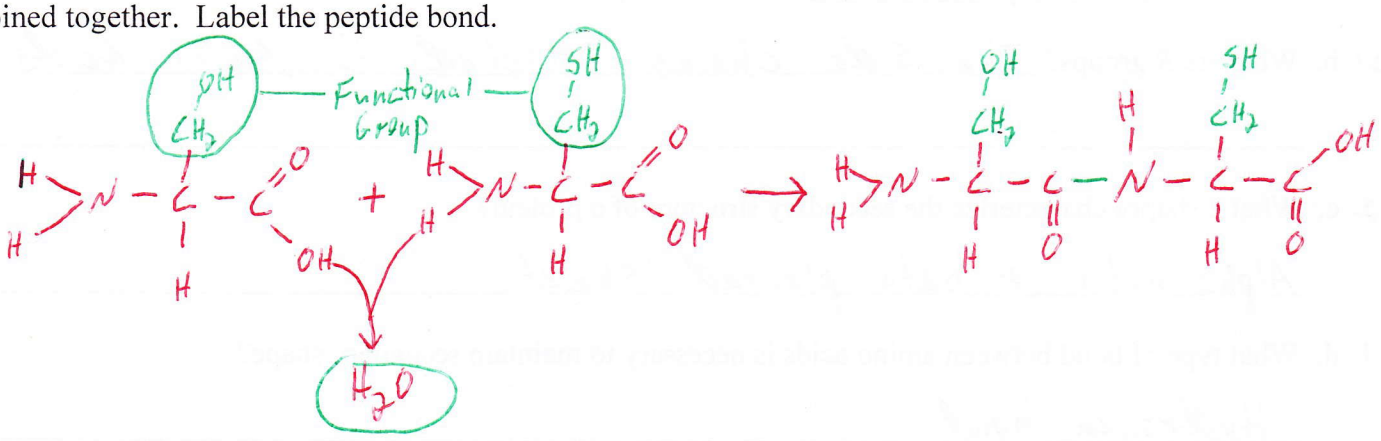
4. Sketch 2 amino acids side-by-side, on one of them label the functional groups, then show how the two can be joined together. Label the peptide bond.

+3



+1 5. What determines the primary structure of a protein?

The unique Sequence of AA

6. Describe the four levels of protein structure:

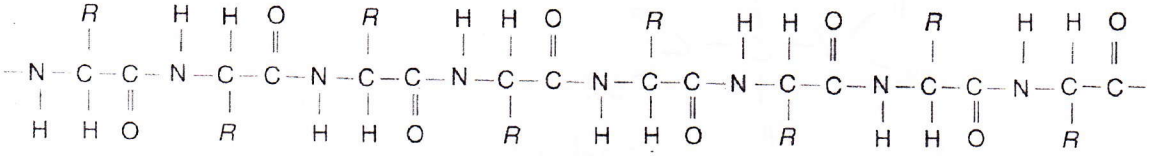
+1 a. Primary The structure of a protein that is a result of the unique Sequence of AA

+1 b. Secondary The structure of a protein that results from the chain repeatedly folding (beta pleated) or coiling (Alpha helix), as a result of H⁺ bonds btwn. backbone constituents

+1 c. Tertiary The overall shape of a polypeptide resulting from interactions btwn side chains (R Groups) of various AA

+1 d. Quaternary The overall protein structure that results from the interaction btwn 2 or more polypeptide chains

7. Study the representation of a polypeptide.



+1 a. This is the Primary structure of a protein.

+1 b. What are *R* groups? The side chains attached to Amino Acids

+2 c. What 2 shapes characterize the secondary structure of a protein?

Alpha helix & beta pleated sheet

+1 d. What type of bond between amino acids is necessary to maintain secondary shape?

Hydrogen bond

+1 e. How does the tertiary shape of a globular protein come about? The interactions btwn side chains (R Groups) of the various AA

+1 f. What would cause a protein to have a quaternary shape? The aggregation of 2 or more polypeptide chains

+1 8. What happens to a protein during denaturation? The protein unravels & Loses it's native shape

+1 9. What is the potential biological significance of improper folding of proteins.

They can cause diseases

+1 10. Explain the role of chaperonin proteins in protein folding.

Chaperonin proteins protect the new polypeptide from "bad influences" in the cytoplasmic environment

+2 11. What are the biological roles of nucleic acids?

Nucleic Acids compose both DNA & RNA which enable Living organisms to reproduce their complex components from one generation to the next AND direct cell activity

+3 12. What are the building blocks of ~~nucleic acids~~ nucleotides? Nitrogenous base, Five Carbon Suger (pentose), a phosphate

13. Briefly describe 2 functions of DNA in the cell.

+1 a. DNA provides directions for its own Replication

+1 b. DNA directs RNA Synthesis & Through RNA directs protein Synthesis

+6 14. Complete the following table to distinguish DNA from RNA:

	DNA	RNA
Sugar	Deoxyribose	Ribose
Bases	ATCG	AUCG
Strands (how many?)	2	1
Helix (yes or no)	Yes	No

+1 15. Name the molecules for which RNA and DNA are abbreviations?

Ribonucleic Acid (RNA) Deoxyribonucleic Acid (DNA)

+1 16. By what kind of bond is the linear chain of nucleotides synthesized?

Phosphodiester Linkage

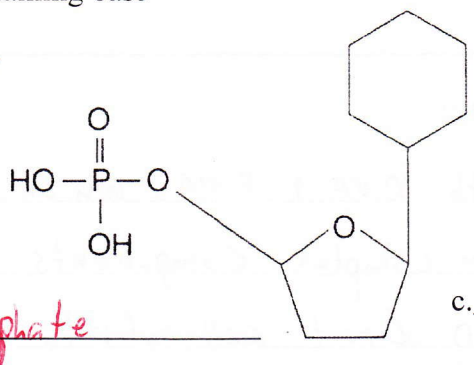
+2 17. Differentiate between the biological roles of DNA and RNA.

DNA → Genetic info to Synthesize RNA

RNA → Copy of Genetic info to Synthesize Proteins

+3 18. On the following diagram, label the components of a nucleotide.

Nitrogen-containing base
Phosphate
Pentose sugar



a. phosphate

b. Nitrogen containing base

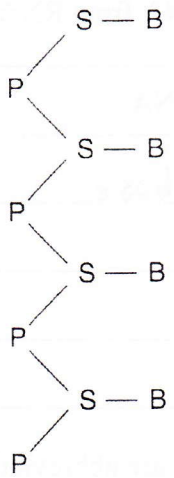
c. Pentose Sugar

+3 19. Refer to the following diagram of a strand of nucleotides to answer questions *a-d*.

a. What molecule is represented by S? Sugar (Pentose)

b. What molecule is represented by B? Base

c. How many different types of B are in DNA? 4



Select the best answer.

+½ B 20. What happens when a protein denatures?
a. Its primary structure is disrupted.
b. Its secondary and tertiary structures are disrupted.
c. It becomes irreversibly insoluble and precipitates.
d. It hydrolyzes into component amino acids.
e. Its hydrogen bonds, ionic bonds, hydrophobic interactions, disulfide bridges, and peptide bonds are disrupted.

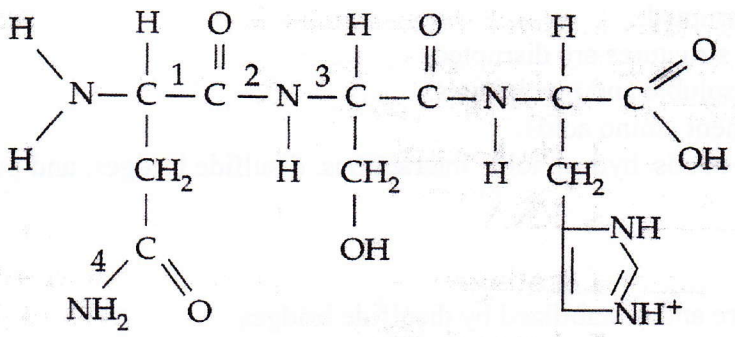
+½ C 21. The α helix of proteins is
a. part of the tertiary structure and is stabilized by disulfide bridges.
b. a double helix.
c. stabilized by hydrogen bonds and commonly found in fibrous proteins.
d. found in some regions of globular proteins and stabilized by hydrophobic interactions.
e. a complementary sequence to messenger RNA.

+½ C 22. β pleated sheets are characterized by
a. disulfide bridges between cysteine amino acids.
b. parallel regions of the polypeptide chain held together by hydrophobic interactions.
c. folds stabilized by hydrogen bonds between segments of the polypeptide backbone.
d. membrane sheets composed of phospholipids.
e. hydrogen bonds between adjacent cellulose molecules.

+½ B 23. What *determines* the sequence of the amino acids in a particular protein?
a. its primary structure
b. the sequence of nucleotides in RNA, which was determined by the sequence of nucleotides in the gene for that protein
c. the sequence of nucleotides in DNA, which was determined by the sequence of nucleotides in RNA
d. the sequence of RNA nucleotides making up the ribosome
e. the three-dimensional shape of the protein

+½ D 24. How are the nucleotide monomers connected to form a polynucleotide?
a. hydrogen bonds between complementary nitrogenous base pairs
b. ionic attractions between phosphate groups
c. disulfide bridges between cysteine amino acids
d. covalent bonds between the sugar of one nucleotide and the phosphate of the next
e. ester linkages between the carboxyl group of one nucleotide and the hydroxyl group on the ribose of the next

+½ C 25. What is the best description of this molecule?



a. chitin
b. amino acid
c. polypeptide (tripeptide)
d. nucleotide
e. protein

+½ B 26. Which number(s) in the molecule in question 25 refer(s) to a peptide bond?
a. 1
b.2
c. 3
d.4
e. both 2 and 4

+½ C 27. If the nucleotide sequence of one strand of a DNA helix is 5'GCCTAA3', what would be the 3'–5' sequence on the complementary strand?
a. GCCTAA
b. CGGAUU
c. CGGATT
d. ATTCGG
e. TAAGCC

+½ B 28. Monkeys and humans share many of the same DNA sequences and have similar proteins, indicating that
a. the two groups belong to the same species.
b. the two groups share a relatively recent common ancestor.
c. humans evolved from monkeys.
d. monkeys evolved from humans.
e. the two groups first appeared on Earth at about the same time.

+½ A 29. Hydrophobic as well as hydrophilic interactions would be important for which of the following types of molecules?
a. proteins
b. unsaturated fats
c. glycogen and cellulose
d. polynucleotides
e. all of the above

+½ E 30. Which of the following is *not* one of the many functions performed by proteins?
a. signals and receptors
b. enzymatic catalyst for metabolic reactions
c. protection against disease
d. contractile components of muscle
e. transport of proteins by chaperonins